

DEAD BIRD COMPOSTING AND NUTRIENT ANALYSIS

DBCNA VERSION 3.1 USERS GUIDE

Introduction

DBCNA version 3.1 is a Microsoft (MS) Excel[®] spreadsheet developed by Florida USDA, Natural Resources Conservation Service (NRCS) Engineering and Ecological Sciences Sections. It uses MS Visual Basic[®] to assist in the design of the dead bird composter and litter storage facility, and development of optional nutrient management plans for disposal of the compost and litter by land applying to crops. This program is based on the criteria for sizing a dead bird composting facility set forth in the NRCS conservation practice standards Composting Facility, Code 317, Nutrient Management, Code 590, and NRCS Animal Waste Management Field Handbook (AWMFH) and Florida supplement to AWMFH for utilization of animal waste.

Note: Before using this program, it is highly recommended that users receive training on the use of this program.

Spreadsheet Purpose and Description

Part of the program assist in the proper sizing of the composting and litter storage facility and is based on user inputs of number of birds, market weight, mortality rate, number of cycles per year, cleanout depths, etc. Another part of the program determines the amount of available nutrients to be applied to crops grown based on nutrients harvested from the crop. The application rate must be compared and adjusted as necessary to rates as recommended by University of Florida, Institute of Food and Agricultural Sciences (UF/IFAS) for the selected crop(s). The nutrient analysis section assists with developing the nutrient budget as required by the conservation practice Nutrient Management, Code 590, when preparing a nutrient plan.

Running the Spreadsheet

To run DBCNA, start MS Excel[®], and open the file <dbcna.xls> (or from your file folder, double click on the file). The MS Excel[®] spreadsheet asks if you want to enable, or disable macros, be sure to click <Enable Macros>. The spreadsheet will not run properly without macros enabled. A screen appears asking for a password. The spreadsheet is password protected and the user should click on <Read Only>. See Figures 1 and 2.

Figure 1

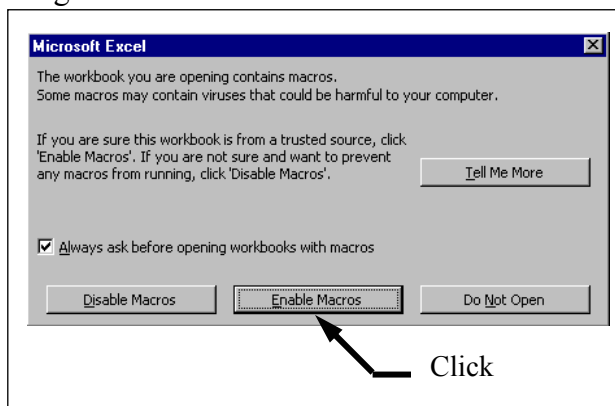
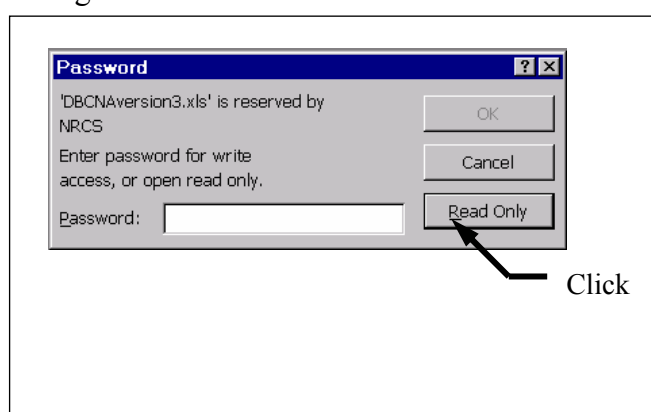


Figure 2



The spreadsheet consists of seventeen worksheets (appears as tabs at the bottom of the program):

- | | |
|------------------------|--------------------------------------|
| (1) "Instructions" | (10) "Storage – 2 Walls" |
| (2) "Intro" | (11) "Storage – 2 Walls (Composter)" |
| (3) "Local Data" | (12) "Storage-2Walls - opposite" |
| (4) "Crops" | (13) "Storage – 3 Walls" |
| (5) "Bin Design" | (14) "Storage – 3 Open Sides" |
| (6) "Standard Bin" | (15) "Storage – 4 walls-2 entrances" |
| (7) "Deep Bin" | (16) "AWMFH Tables" |
| (8) "Linear Stack Bin" | (17) "Lab Data" |
| (9) "Storage" | (18) "AWMFH" |

The "Instructions" worksheet contains a link to the program documentation and instructions. Data is entered in the "Intro", "Crops", and "Local Data" worksheets. The "Crops" worksheet calculates the crop nutrient removal rates for the given crop information. If composting is chosen, data is entered in the "Bin Design" worksheet. Depending on the composting method chosen, "Standard Bin", "Deep Bin", and "Linear Stack Bin" worksheets calculates the number or size of bins required for composting for the given poultry information.

Data is entered in the "Storage" worksheet to calculate, depending on the type of storage facility chosen, the size of storage facility required on worksheet "Storage – 2 Walls", "Storage – 2 Walls (Composter)", "Storage-2Walls-opposite", "Storage – 3 Walls", or "Storage – 3 Open Sides."

"AWMFH Tables" worksheet is an information sheet with waste/manure and nutrient losses data taken from the AWMFH. Data is entered in the "Lab Data" and "AWMFH" worksheets to calculate the amount of litter/compost required based for the given crops. In addition, these two worksheets calculate the amount of acreage required to utilize the amount of nutrient in the litter produced by the poultry farm to the given crop removal. It is highly recommended that lab data

be used to calculate the total nutrients produced from the poultry farm. If no lab data is available, use the AWFMH data until lab analysis of the waste/litter is available.

Note: For all the worksheets, all cells in yellow are data entries to be entered by the user. *Do not* use the “Tab” key to move from cell to cell. Instead use the mouse or the arrow keys. To clear any data that are already there, right mouse click and choose “*clear contents*”.

After entering information in “Local Data” worksheet with local crop data, the user should save the file as the master file for future use. Go to <File>, <Save as>, under file name enter <countynamedbcna.xls>, click on <Save>.

Intro (Worksheet)

First, enter data on the “Intro” worksheet. Begin by entering the designer’s and checker’s names, the date, operator, company name, and the county. Then enter data in the yellow-shaded areas, number of birds, poultry type, mortality rate in percent, life of flock in days, bird market weight in pounds, average weight of birds per cycle in pounds, number of cycles per year, type of dead bird disposal, litter storage type. If a composter is chosen as the type of dead bird disposal, type of composter has to be chosen. Then, enter data for the percent of litter exported and percentage of litter fed to livestock or amount of litter used as feed. Enter the crops considered for land application of the litter, the acreage, the conservation plan field number, and the design nutrient (See conservation practice standard, Nutrient Management, Code 590 for determining the limiting nutrient for design). The field designation cannot be changed. The worksheet is set up for five (5) field designations. The conservation plan field number can be entered to correlate with the field designation.

The “Intro” worksheet can be printed by selecting the print button at the bottom of the worksheet. Select the continue button to move to the next worksheet.

Crops and Local Data (Worksheets)

The “Local Data” worksheet is provided for the most common crops used for animal waste application. The production levels should be entered for the work area based on known data. Crops and nutrient content for the crops listed have been pre-entered based on statewide data. On this worksheet, you may add additional crops and their nutrient content or change the existing ones.

Once you have this data entered for your work area, you may print this page so the **exact** spelling is used in the “Intro” worksheet in the crops considered section. It is very important that the crops entered in the “Intro” worksheet are spelled exactly the same as in the “Local Data” worksheet for the “Crops” worksheet to look-up the associated data. Remember, local crop data entered should be saved as the master file for future use. Go to <File>, <Save as>, under file name enter <countynamedbcna.xls>, click on <Save>.

The “Local Data” worksheet has four (4) tables. The first table is for irrigated crops and the second table is for non-irrigated crops. Each crop in both tables has three (3) production yields,

low, medium, and high. The units and average nutrient concentration have to be entered. The other two (2) tables are for the conversion of a bushel of a particular grain crop to dry weight in pounds and percentage of dry matter (DM) for particular silage crops.

Crop information entered in the “Intro” worksheet is brought over to the “Crops” worksheet. Any changes to the type of crops and acreage can only be made in the “Intro” worksheet. Depending on the type of crops entered in the “Intro” worksheet, the “Crops” worksheet looks up the given crops from the “Local Data” worksheet and retrieves the associated data such as average yield, units, % DM, average pounds per bushel for grain crops, and average nutrient concentration.

In the “Crops” worksheet, if the default average nutrient concentration is used to calculate the crop removal rate of nutrient, an “X” has to be entered in the designated column. If not, average nutrient concentration has to be entered.

Once you have determined the production capability of the field(s) you are working with you will still enter the yield you determine, so even though the high average yield for irrigated corn in your work area is 150 bushels, you have determined that based on the soils, previous yields, management capabilities, and plant population that this client on this field has a realistic yield production potential of 180 bushels. So the default may show 150 bushels you must still enter the selected yield of 180 bushels.

When considering the crops grown, you must enter all the crops grown in that field for that year. Note that you cannot change the Field A – D designation; however, you can and should show the conservation plan field designation(s) in the appropriate columns. Field A could be conservation plan fields 1 or 1-5. This is appropriate for fields where the whole field is single, double or triple cropped, have the same crops grown and the same production potential.

Any field that has only a portion of the whole field double cropped must be shown as two separate fields. Example: Field A (also field 1) is 100 acres of bermudagrass of which 40 acres will be used for ryegrass. You must enter Field A (now field 1a) as 60 acres bermudagrass (single crop) and Field B (now field 1b) as bermudagrass and ryegrass (double cropped)

The “Crops” and “Local Data” worksheets can be printed by selecting the print button. Choose the “Click here to Continue” button to proceed to the next section, “Bin Design” worksheet.

Bin Design (Worksheet)

If freezer or incinerator was chosen, there is warning at top of the page that “Bin Design” worksheet should not be used. To change this, the user needs to return to the “Intro” worksheet and select the appropriate type of dead bird disposal. Information such as number of birds on farm, anticipated mortality for flock, weight of birds near maturity, average weight of birds per cycle, and life of flock are transferred from “Intro” worksheet to “Bin Design” worksheet. Any changes to these data mentioned above have to be done to the “Intro” worksheet.

“Bin Design” worksheet calculates the weight of daily loss and the composter volume required. The user has to enter one or two stages for the composter. For a two-stage composter, Stage 1 of

the 2-stage composter allows 2.5 cu. ft. composter volume per pound of weight loss per day at maturity. Single stage composter allows 3.75 cu. ft. of composter volume per pound of weight loss per day. The user has to enter the type of composter to be used, standard bin, linear stack, or deep bin.

The “Bin Design” worksheet can be printed by selecting the print button at the bottom of the worksheet. Select the appropriate button to design the type of composter chosen.

Standard Bin, Linear Stack Bin, and Deep Bin (Worksheet)

Dimensions of the bin are entered. The “Standard Bin” and “Deep Bin” worksheets calculate the number of bins and the “Linear Stack Bin” worksheet calculates the length required to compost the dead birds. Each one of the worksheets recommends the number of bins or the length required, and the user has to enter the number or length of bins used. Then, the worksheets calculate the total volume in the bins.

The “Standard Bin”, “Linear Stack Bin”, and “Deep Bin” worksheets can be printed by selecting the print button at the bottom of the worksheet.

Storage (Worksheet)

Cleanout information is entered in this section. It is important that all cleanout information for each house is entered for the **year**. The information will be used to calculate the minimum storage required, the desired storage volume, and the tons of litter produced per year. The user has the option to enter the depth of cleanout and the dimensions of each house or enter the volume of the cleanout equipment (or spreaders) and the number of trips to clean each house. If each cleanout for the same house has a different depth of cleanout or different number of trips with the equipment, the user should enter the information separately. Number of cleanouts to store and percentage of cleanout to store have to be entered. The user then enters the manure ratio. Manure ratio is the weight of litter or manure needed to compost the weight of carcass ratio. The recommended ratio is 1.2 for litter and 1.5 for manure. Also, the user chooses the type of storage for the litter.

The “Storage”, “Storage-2 walls”, “Storage-2 walls (composter) and “Deep Bin” worksheets can be printed by selecting the print button at the bottom of the worksheet.

Storage – 2 Walls, 2 Walls (Composter), 2 Walls-Opposite, 3 Walls, 3 Open Sides, and 4 Walls With 2 Entrances (Worksheets)

There are six (6) types of storage: 2 walls, 2 walls with composter in same building, 2 walls with composter on opposite side in same building, 3 walls, 3 open sides, and 4 walls with 2 entrances. Depending on the type chosen in “Storage” worksheet, the user is taken to the corresponding worksheet to calculate the dimensions of the storage building. To use the “Storage - 2 walls (composter)” worksheet or the “Storage-2 walls-opposite” worksheet, “linear stack composter” **and** “Storage – 2 walls (composter)” or the “Storage-2 walls-opposite” have to be chosen from the drop down menus in the “Bin” and “Storage” worksheets. For all six worksheets, the user enters data such as the slope of the litter pile, width of building, maximum height of the litter pile, height of wall, height of pile at side walls, height to gable end closure wall, and building post spacing. Other data that are needed on some of the worksheets are the freeboard between composter and litter storage area, roof eve height, and width of entrance. Maximum height of the litter pile is seven feet and maximum height of pile at side walls is five feet. Warnings are given when data entered exceeds the allowable height or the total length used is not divisible by the post spacing. The worksheets calculate the recommended total length of the storage building. The user then enters the total length to be used. Then, the worksheets take the length of building to be used and calculates the actual storage volume and the floor area. “Storage – 2 walls (composter)” worksheet calculates the required length of the storage area by two methods and will recommend the shortest length required (See Figure 1 and Figure 2 of “Storage – 2 walls (composter) worksheet). This worksheet will indicate which of the two methods is used to recommend the total composter length. For all six worksheets, the user has the option of printing the worksheet, go to “Lab Data” worksheet or “AWMFH” worksheet, or return to “Storage” or “Intro” worksheet by selecting one of the buttons at the bottom of the worksheet.

Nutrient Analysis

Nutrient content of the litter/compost is needed to develop a nutrient management plan. There are two ways to enter the nutrient content of the litter/compost. One way is through lab analysis of the litter/compost and the other is obtaining the information from the AWMFH. To develop a nutrient management plan for disposal of the compost and litter by land applying to certain crops, choose the appropriate button to go to the worksheet using the lab data of the litter/compost or the worksheet using the AWMFH data.

Lab Data and AWMFH (Worksheets)

“Lab Data” and “AWMFH” worksheets calculate the total amount of litter needed for the desired crops based on **crop removal** (see Checks, Warnings and Limitations below), excess or deficit of nutrient is based on the amount of litter applied, and acres required to utilize all the nutrients is based on N and P₂O₅ available. For the “Lab Data” worksheet, the user has to enter the lab's litter analysis results or use the default data. *The default data were obtained from UF/IFAS manure testing lab in Live Oak (See AWMFH Amendment FL-9 that describes FL651.1004(f) for explanation of the default values.)* It is highly recommended that lab data be used for the calculation of total nutrient produced for the poultry farm.

The lab data should give the total N and P per ton of litter. Total N and total P should be used and not the nutrient content after all losses (DBCNA program calculates the losses). The recommended application rate from the lab analysis (if provided in the lab report) should not be used.

For “AWMFH”, under Nutrient Losses section, the user has to enter excreted manure information. This information can be obtained from the AWMFH, Chapter 4 or go to “AWMH Tables” worksheet to retrieve the necessary information.

Litter density and crops information are transferred from other previous worksheets to “Lab Data” and “AWMFH” worksheets. Litter annual cleanout volume, litter annual cleanout weigh, and tons of litter used for feed and export are calculated based on the information entered in previous worksheets. For “Lab Data” and “AWMFH” worksheets, percent nutrient losses are entered. The information can be obtained from the AWMFH, Chapter 11 or go to “AWMFH Tables” worksheet to retrieve the necessary information.

“Lab Data” and “AWMFH” worksheets calculate the total nutrients produced and the nutrients available after losses. Both worksheets also calculate the pounds of nutrients per ton of litter after losses. The worksheets recommend the tons of litter to be applied based on the given crops. The user enters the tons of litter applied per acre for each individual crop. Based on the tons of litter entered by the user, the worksheets calculate the total N, P_2O_5 , and K_2O applied per acre per crop and the total nutrient(s) applied per acre per field. In addition, the worksheets indicate if there is a deficit or excess of N or P_2O_5 for each crop and for each field.

The worksheets calculate tons of total estimated available litter, total acreage where litter will be applied, total tons of litter required for the specified acreage to meet crops’ utilization (removal) rate, and total tons of litter applied. Warnings will be given if there is not enough litter produced to meet all of the crops’ utilization (removal) based on the crop yield and acreage planned.

The next part of the worksheets address supplemental fertilizer. Any fertilizer applied during any part of the year should be accounted for in this section. This section can also include any other type of manure (i.e. beef cattle manure, dairy manure, municipal waste) applied in these fields. The worksheets then calculate the total nutrient(s) applied on these fields.

The last section of the worksheets calculates the acres required based on N and/or P_2O_5 as the limiting nutrient. The user can vary the percentage of litter applied (based on the total amount of litter produced for the year) and obtain the required acreage based on N **or** P_2O_5 .

Checks, Warnings and Limitations

The spreadsheets have several error checks and warnings. The spreadsheets check to determine if the input values are within an acceptable range.

Note that when using this program on grazed pasture, it may show larger amounts of phosphorus removed when actually only small amounts of phosphorus are removed. Soil test results and a complete nutrient budget considering the fate of nutrient removal and recycling must be considered in the nutrient plan. In addition, the amount of nitrogen removed when harvesting

the crop(s) is usually less than the amount of nitrogen needed to produce the crop. Therefore, realistic yield goals and UF/IFAS nutrient recommendations must be considered in preparing the final nutrient budget.

References

The following references are utilized in the DBCNA program.

Worksheets in DBCNA follow the corresponding Florida engineering forms:

<u>DBCNA Worksheet</u>	<u>Florida Engineering Forms</u>
“Intro”	FL-ENG-312A Poultry Litter and Compost Data Worksheet
“Bin Design”	FL-ENG-317A Dead Bird Composter Sizing Worksheet
“Standard Bin”	FL-ENG-317A Dead Bird Composter Sizing Worksheet
“Deep Bin”	FL-ENG-317A Dead Bird Composter Sizing Worksheet
“Linear Stack Bin”	FL-ENG-317A Dead Bird Composter Sizing Worksheet
“Storage”	FL-ENG-317B Litter Storage Requirements Worksheet
“Storage – 2 Walls”	FL-ENG-313C Poultry Composter/Litter Dry Stack Structure Design Worksheet (Two Walls)
“Storage – 2 Walls (Composter)”	FL-ENG-313D Poultry Composter/Litter Dry Stack Structure Design Worksheet (Two Walls – Composter and Litter Storage in Same Building)
“Storage – 2 Walls - Opposite”	FL-ENG-313G Poultry Composter/Litter Dry Stack Structure Design Worksheet (Two Walls – Composter (on opposite walls) and Litter Storage in Same Building)
“Storage – 3 Walls”	FL-ENG-313B Poultry Composter/Litter Dry Stack Structure Design Worksheet (Three Walls)
“Storage – 3 Open Sides”	FL-ENG-313A Poultry Composter/Litter Dry Stack Structure Design Worksheet (Three Open Sides)
“Lab Data”	FL-ENG-312B Land Area Requirements for Poultry Wastes and Litter Worksheet
“AWMFH”	FL-ENG-312B Land Area Requirements for Poultry Wastes and Litter Worksheet

Conservation Practice Standards:

Composting, Code 317

Nutrient Management, Code 590

AWMFH

Chapter 4, Amendment FL-9, FL651.1004(f)

Chapter 11

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